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To: Commissioner of Patents and Trademarks
Washington, D.C. 20231

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Subject: Serial No. 09/822,491 04/02/01

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A WAY TO IMPROVE HARD BIAS PROPERTIES FOR AN ABUTTED JUNCTION CMR RECORDING HEAD

Grp. Art Unit: 2858

INFORMATION DISCLOSURE STATEMENT

Enclosed is Form PTO-1449, Information Disclosure Citation In An Application.

The following Patents and/or Publications are submitted to comply with the duty of disclosure under CFR 1.97-1.99 and 37 CFR 1.56. Copies of each document is included herewith.

U.S. Patent 5,646,805 to Shen et al., "Magnetoresistive Read Transducer with Partially Abutted Junctions", teaches the formation of an AMR sensor whose end portions partially abut longitudinal bias layers formed of hard magnetic materials whose composition is not specifically noted.

U.S. Patent 5,739,987 to Yuan et al., "Magnetoresistive Read Transducers with Multiple Longitudinal Stabilization Layers", teaches the formation of an abutted junction type AMR sensor in which longitudinal bias is provided by a multilayer formation of alternating soft ferromagnetic (FM) and antiferromagnetic (AF) films.

U.S. Patent 5,739,990 to Ravipati et al., "Spin-Valve GMR Sensor with Inbound Exchange Stabilization", teaches the formation of a GMR type sensor in which the longitudinal bias is provided by either a hard magnetic layer of CoCrPt or CoCrTaPt, or various forms of conductive or non-conductive antiferromagnetic materials.

U.S. Patent 5,742,459 to Shen et al., "Magnetic Head Having Encapsulated Magnetoresistive Transducer and Multi-layered Lead Structure", teaches the formation of an encapsulated AMR sensor in which a layer of refractory material surrounds the magnetoresistive portion of the senosr and protects it from diffusion and electromigration from the bias layers and conductive lead layers on either side.

U.S. Patent 5,759,681 to Hosoe et al., "Magnetic Recording Medium and Magnetic Recording System Using the Same", teaches the formation of an entire recording system which includes a magnetic disk of novel material structure and a read/write head designed to read the write on said disk.

U.S. Patent 6,018,443 to Watanabe et al., "Thin Film Magnetic Head Having Hard Films for Magnetizing a Shield Layer in a Single Domain State", teaches the use of hard magnetic bias layers for maintaining single domain structures in both the shields and the magnetoresistive layers of a GMR read head.

U.S. Patent 6,046,892 to Aoshima et al., "Magnetoresistive Head with Improved Underlayer", teaches the formation of a GMR read element having an underlayer that reduces current loss.

The following two articles report that the properties of magnetic layers can be improved when they are formed on appropriate underlayers:

1) E. W. Singleton et al., "Effects of Cr, CrV, and CrTi Underlayers on Magnetic, Structural, and Materials Reliability Properties of CoPt Thin Films", Journal of Applied Physics, Vol. 85, no.8, April 15, 1999, pp. 5840-5842.

2) N. Inaba et al., "Magnetic and Crystallographic Properties of CoCrPt Thin Films Formed Cr-Ti Single Crystalline Underlayers", Journal of Applied Physics, Vol. 79, No. 8, April 15, 1996, pp. 5354-5356.

Sincerely,

Stephen B. Ackerman, Reg. #37761